REMARKS

Applicants respectfully submit that all the claims presently on file are in condition for allowance, which action is earnestly solicited.

THE SPECIFICATION

The Abstract was objected to for containing certain informalities. These informalities have now been corrected.

THE CLAIMS

CLAIM REJECTION UNDER 35 U.S.C. 102

Claims 1-10 were rejected under 35 U.S.C. 102(b) as being anticipated by Nielson et al. (U.S. Patent No. 5,661,257), hereinafter referred to as "Nielson". Applicants respectfully submit that Nielson does not disclose all the elements and limitations of the independent claim 1. Consequently, claim 1 is not anticipated under 35 U.S.C. 102, and the allowance of this claim and the claims dependent thereon is earnestly solicited. In support of this position, Applicants submit the following arguments:

A. Legal Standard for Lack of Novelty (Anticipation)

The standard for lack of novelty, that is, for "anticipation," is one of strict identity. To anticipate a claim for a patent, a **single prior source must contain** all its essential elements, and the burden of proving such

anticipation is on the party making such assertion of anticipation. Anticipation cannot be shown by combining more than one reference to show the elements of the claimed invention. The amount of newness and usefulness need only be minuscule to avoid a finding of lack of novelty.

The following are two court opinions in support of Applicant's position of non anticipation, with emphasis added for clarity purposes:

- "Anticipation under Section 102 can be found only if a reference shows **exactly** what is claimed; where there are **differences** between the reference disclosures and the claim, a rejection must be based on obviousness under Section 103." *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

- "**Absence** from a cited reference **of any element** of a claim of a patent negates anticipation of that claim by the reference." *Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565, 230 USPQ 81 (Fed. Cir. 1986), on rehearing, 231 USPQ 160 (Fed. Cir. 1986).

B. Brief Summary of the Present Invention

Prior to presenting substantive arguments in favor of the allowability of the claims on file, it might be desirable to summarize the present invention.

An electronic light source system creates a flameless tracer for a munitions projectile. The electronic light source system may be positioned in various locations and combinations of locations on a projectile (e.g., front, back, side, inside, etc.) to enhance the visibility of the projectile during flight and mark the target. The present system further overcomes the environmental or safety issues of pyrotechnic tracers.

The present system is encapsulated in glass or clear plastic to G-harden to sustain the large loads and stresses at gun launch. The projectile carries tracers to impact the target, and disperses the tracers surrounded by a sticky substance to adhere to the target. The tracers comprise a variety of light sources such as lasers, high output light-emitting diodes (LEDs), strobe lights, etc. The tracer is capable of flashing the light sources at a variety of frequencies (e.g., 5 Hz, 20 Hz, etc.) to further attract the human eye. In addition, the present system presents the substantial benefit of being able to project light at various wavelengths outside the visible spectrum.

Moreover, the present system includes, in addition to the tracer, a marker that is carried as a payload inside a transparent or translucent projectile body. The marker could be activated during flight to act as a primary tracer, or alternatively as a secondary tracer (with the primary tracer being secured to the outer body of the projectile).

Applicants wish to emphasize the distinction between a tracer and a marker, as defined and used in the instant application. A tracer provides a visual indication during the entire flight of the projectile, and once the projectile impacts with the target, the tracer is inactivated. On the other hand, a marker is intend to mark a target area, and is activated upon impact with the target area. Furthermore, in a specific embodiment, a marker could play the double role of a tracer and a marker.

C. Application of the Legal Standard of Novelty to the Present Invention

Applicants will now present arguments in support of the allowance of the independent claim 1, and the claims dependent thereon, over Nielson. Representative claim 1 as amended, will now be discussed and in light of Nielson.

C.1. Nielson does not describe a flameless tracer utilizing an electronic light source

The present invention discloses a flameless tracer utilizing an electronic light source, for use with a projectile for a substantial part of its flight to impact a target. FIG. 5 (FIGS. 5A, 5B) is a representative cut-away view of an artillery projectile 500 utilizing electronic tracer 120E and electronic tracer 110E. The electronic tracer 120E may be preferably attached on the or side rear of projectile 500.

Electronic tracer 120E and protective cap 130E may be attached using either epoxy or threaded connection (not shown). Electronic tracer 110E may be attached to projectile 500 using epoxy. Hence the tracers 120E and 110E stay with the projectile 500 to impact the target. As an example, the present system of **a projectile and tracers attached** to it has the delivery capability and precision to **travel deep inside a cave to mark a target.**

In contrast to the present invention, Nielson teaches away from a projectile that carries a flameless tracer that impacts a target. Nielson teaches that as the delivery vehicle approaches the target to be marked, the individual target marker components are ejected such that the

smoke canister and the near infrared emitting photodiodes fall to the ground and the radar chaff is dispersed in the atmosphere above the target. The marker provides covert marking capability **in the air** and on the ground that enables aircraft and ground based personnel to locate covertly identified targets.

Nielson discloses an alternative embodiment. As the delivery vehicle approaches the target to be marked, the chaff package is expelled from the marker and detonates above the target between about 2000 feet and 5000 feet above ground level. **The smoke** creates a line in the sky en route to the target area. When the parachute is deployed, it pulls out the near infrared photodiodes. The photodiodes remain tethered to the parachute. The marker provides covert marking capability **in the air** that enables aircraft and ground based personnel to locate covertly identified targets.

In summary, **Nielson discloses target marker components that eject from the projectile during the later part of the projectile flight prior to target impact,** and they either drop by free fall to the target or get carried by a parachute to the target.

However, **Nielson does not teach a flameless tracer** utilizing an electronic light source, for use with a projectile the entire flight of the projectile toward a target. In contrast, Nielson teaches a multitude of individual target marker components that are ejected during projectile flight such that the smoke canister and the near infrared emitting photodiodes fall to the ground and the radar chaff is dispersed in the atmosphere above the target. At approximately the same time the chaff

section detonates, **the visible/infrared smoke section 48 ignites and begins producing a smoke line in the sky.**

In Nielson, the control mechanism of a drop by free fall or getting carried by a parachute is much more limiting than a projectile in flight. The system disclosed by Nielson would be significantly limited in its **capability to deliver the marker components with a degree of controllability and accuracy**, for example deep inside a cave, to mark a target as disclosed in the present invention. Hence Nielson could not have anticipcted the projectile delivery capability of the present invention.

C.2. Nelson does not describe a G-hardened light source that remains secured to the outer perimeter of the projectile during the entire flight of the projectile toward the target, and that upon impact of the projectile, the G-hardened light source is disconnected from the power source.

As described earlier, Nielson discloses target marker components that eject from the projectile during the later part of the projectile flight **prior to target impact**, and they either drop by free fall to the target or get carried by a parachute to the target. In addition, contrary to the present invention, the marker components of Nielson are activated prior to impact with the target.

C.3. Conclusion as to Claim 1

Based on sections C.1 and C.2, above, claim 1 is not anticipated by Nielson and the allowance of claim 1 and the claims dependent thereon

is respectfully requested. The following sections will address additional features recited in the various dependent claims.

C.4. Claim 34 - Nielson does not teach a flameless marker that remains inactive until impact with the target

Claim 34 recites that the marker of the present invention remains inactive during substantially the entire flight of the projectile until impact with the target area. Nielson does not describe such a feature; rather, as presented earlier, Nielson's marker is activate prior to impact with the target.

C.5. Claim 42 - Nielson does not teach a flameless tracer or marker on a projectile with light frequencies from UV, through the visible spectrum to infrared.

The present invention discloses a flameless tracer utilizing an electronic light source, for use with a projectile for a substantial part of its flight to impact a target. At least one G-hardened electronic light source and power source have a position comprising a front, back, side and inside of the projectile to selectively enhance visibility of the projectile during flight and to deliver a mark on the target.

The present system may comprise a variety of light sources such as, for example, lasers, high output light-emitting diodes (LEDs), strobe lights, laser diodes, photo diodes, etc. The present system is capable of flashing the light sources at a variety of frequencies (e.g., 5 Hz, 20 Hz, etc.) to further attract the human eye. The light sources may be purchased at electronic stores at designated frequency, intensity, and wavelengths. Furthermore,

the present system presents the substantial benefit of being able to project light at various wavelengths outside the visible spectrum. Some light sources that may be used by the present system are available, for example, in infrared (IR), ultraviolet (UV), and visible wavelengths and at various frequencies. Consequently, the present system comprising light sources such as IR or UV could be used in tactical situations such that the tracer and/or marker is visible only to personnel using IR night vision, UV detectors, etc. Furthermore, the present system can provide **a light source in the visible wavelengths**, allowing troops to see colors that have specific tactical meaning. In addition, the present system can be configured to provide a tracer with no mark, a trace with mark, or no trace but a mark on a target. The configuration is determined by the need of the soldier using the item.

FIG. 12 illustrates an embodiment in which the tracers are positioned inside a projectile. Upon gun launch, the packages 1210 or package 1220 rupture or shatter allowing the contents comprising the light-emitting sources 122 and sticky material 1212 to mix. The light-emitting sources 122 are provided power by setback-activated battery 600C and begin operation, emitting light. If the projectile is transparent or translucent, a trace of the flight is seen by an observer due to the high intensity light from the light-emitting sources 122.

Nielson does not disclose flameless tracer on a projectile with light frequencies from UV, through the visible spectrum to IR. Nielson teaches the use of a smoke canister and near infrared emitting photodiodes. In particular, Nielson teaches photodiodes located within a target marker canister that **emit light signal in the near infrared region that is completely invisible to the human eye**, and visible only through night vision devices.

C.6. Claim 40 - Nielson does not describe a flameless tracer of multiple light-emitting devices that are surrounded by a sticky substance and that disperse upon target impact to adhere to a target for marking.

The present invention teaches a sticky substance (i.e. silicon gel or gelatin) in a container such as glass, plastic vials, plastic bags, etc. are contained in the projectile to help the devices stick to and mark a target. The projectile impact disperses the sticky light-emitting devices on the target, marking the target. The sticky material cushions and protects the light-emitting devices as they disperse on the target and helps them to adhere to the target.

FIG. 11B is a cutaway view of package 1210 comprising the light-emitting sources 122 surrounded by a sticky substance 1212 such as silicone liquid or gel. Package 1210 is made of a plastic or composite bag 1211 that holds the light-emitting sources 122 and sticky liquid or gel 1212. The package 1210 may be placed into projectiles 100, 200, 300, 400, 500 and delivered to the intended target that will be marked.

FIG. 11C is a cutaway view of an alternate containment system for the light-emitting source 122, package 1220. The light-emitting source 122 is placed in sealed glass vials 1222 (glass vials are commonly manufactured in industry by melting the ends of glass tubes) and surrounded by sticky liquid or gel 1212. The vials are held apart by a plastic or composite spider 1221.

FIG. 2 (FIGS. 12A, 12B, 12C) is a cutaway view of a mortar projectile (mortar 1300). FIG. 12A is a cutaway view of mortar 1300 containing packages 1210 which is surrounded by sticky material 1212. FIG. 12B is a cutaway view of a mortar 1300 containing package 1220 that is surrounded by sticky material 1212. A side view of the plastic or composite spider 1221 is shown. The glass vials 1222 side into and are held apart by holes in the spider.

Upon gun launch, the packages 1210 or package 1220 rupture or shatter allowing the contents comprising the light-emitting sources 122 and sticky material 1212 to mix. The light-emitting sources 122 are provided power by setback-activated battery 600C and begin operation, emitting light. If the projectile is transparent or translucent, a trace of the flight is seen by an observer due to the high intensity light from the light-emitting sources 122. If the project is opaque, there is no trace.

Upon impact of mortar 1300 with the target, the plastic or composite of the mortar 1300 shatters and deposits the light-emitting sources 122 covered with the sticky material 1212 onto the target. The high intensity light from the light-emitting sources 122 now marks the target in UV, visible, and/or IR light. Missiles and smart projectiles equipped with sensors and seekers set to detect the wavelengths of the light-emitting sources 122 can now see the marked target and travel to it.

Nielson teaches away from the silicon gel type of sticky substance surrounding the electronic tracer. Rather, Nielson **teaches a tracer assembly of light emitting diodes preferably encased in a hardened polymeric molding compound**. Upon target impact, the light emitting

diodes would be prevented from dispersion due to their encasement in a hardened polymeric molding compound.

In operation, as the delivery vehicle approaches the target to be marked, the individual target marker components are ejected such that the smoke canister and the near infrared emitting photodiodes fall to the ground and the radar chaff is dispersed in the atmosphere above the target. The marker provides covert marking capability in the air and on the ground that enables aircraft and ground based personnel to locate covertly identified targets.

In the **present invention**, the projectile may carry and deliver to a target **dozens, hundreds, or thousands of miniature flashing lights in a sticky gelatin-like substance**. In contrast, Nielson teaches only one tracer assembly of light emitting diodes preferably encased in a hardened polymeric molding compound that is carried by a parachute to a target.

C.7. Claim 39 - Nielson does not describe a flameless tracer with a light-emitting marker comprised of a MEMS.

Nielson does not describe the feature of claim 39 that the flameless tracer includes a light-emitting marker that is comprised of a micro-eletrical-mechanical system (MEMS).

CONCLUSION

All the claims presently on file in the present application are in condition for immediate allowance, and such action is respectfully requested. If it is felt for any reason that direct communication would

Application Serial No.: 10/605,380
Filing Date: 09/26/2003

Reply to Office action of: 05/25/2005
Attorney Docket No.: 2003-006

serve to advance prosecution of this case to finality, the Examiner is invited to call the undersigned at the below-listed telephone number.

Respectfully submitted,

Date: Aug. 1, 2005

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